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Design of waste cooking oil collection center in Semarang City using maximal covering location problem: A finding from Semarang. Indonesia

[Hartini S.](#) ; [Puspitasari D.](#); [Utami A.A.](#)
[Save all to author list](#)^a Department of Industrial Engineering, Universitas Diponegoro, Semarang, 50275, Indonesia
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Abstract

Most waste cooking oil (WCO) in Semarang is still disposed of in landfills since there is an inadequate facility to collect those wastes. There are only three collection centers of WCO identified in Semarang. The alternative to sell WCO is also not the best option as the amount of WCO generated from households is less than the culinary enterprise. Thus, having a collection channel that can thoroughly cover all the supply points of WCO from the household in Semarang is a necessity. This research will

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Sari, D.P. , Masrurroh, N.A. , Asih,

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Preface

After being successfully held in 2019, the 2nd International Conference on Environment, Sustainability Issues and Community Development (INCRID) 2020 was held at a full teleconference in a virtual environment on October 21st, 2020, by “ZOOM”. The reason is, active cases of COVID-19 in Indonesia are still increasing, and it is not sure whether October 2020 has returned to normal. Besides, we want this conference to be held regularly. INCRID 2020 is hoped to bring innovative ideas from academics and industrial experts in the field of environment. The conference's primary goal is to promote research and developmental activities in environmental sciences and promote scientific information interchange between researchers, developers, engineers, students, and practitioners working all around the world. The conference was held every year to make it an enabling platform for people to share views and experiences in an environmental context. The conference featured five keynotes (40 minutes each, including Q&A). The plenary session was divided into 2 sessions, which 2 of the 5 speakers gave their talk in the first session and the last 3 in the second session. The speakers shared their slides (through share screen mode) by themselves. However, the committee helped them to share the slides whenever the speakers were getting trouble. Discussion and Q&A in the plenary session were included in the time that was given to them. The moderator gave a sign if the time was over through Zoom's personal chat. Also, we passed 10 minutes for each presentation through the zoom's breakout room. We divided the parallel session into 8 rooms, which can be attended by 10 people (minimum) for each room. Apart from using the zoom platform, We also try to use any other system such as youtube and Instagram for plenary session live streaming and google forms for ensuring the participant attends the conference from beginning to the end. There were around 110 participants, 5 keynotes speakers, 10 moderators (2 in keynote session and 8 in parallel session), 8 co-host, and 48 committees. Participants can share their thoughts remotely (from their home).

We invited some international participants as asked speakers in parallel sessions, including Uganda, Egypt, Japan, Malay, Aussie, and other countries. We were incredibly honored to have invited Dr. Haryono Setiyo Huboyo, S.T., M.T, from Diponegoro University, Indonesia, to serve as our General Conference Chair. The rest of the committee was composed of Indonesia, Italy, Australia, Japan and other countries. In the keynote presentations part, we invited Dr. Swaib Semiyaga from Makerere University (Uganda), Mario Rosario Guarracino, Ph. D from National Research of Council of Italy (Italy), Prof. Dr. Ir. Ambariyanto, M.Sc. from Diponegoro University (Indonesia), Prof. Toru Matsumoto from University of Kitakyushu (Japan), and Dr. Mai Sayed Fouad from Fayoum University (Egypt). The conference provided a forum for discussing environmental topics and, in particular, for promoting the exchange of new ideas and the presentation of the latest developments in this field. This conference also provided an ideal environment for developing new collaborations and meeting experts on the fundamentals, applications, and products of the mentioned fields.

We are glad to share with you that we received lots of submissions from the conference, and we selected a bunch of high-quality papers and compiled them into the proceedings after rigorously reviewed them. These papers feature the following topics: environment, health, and safety, environmental science, technology, and education, green infrastructure, and energy conservation and efficiency. All the papers have been through rigorous review and process to meet the international publication standard's requirements. Lastly, we would like to express our sincere



gratitude to the Chairman, the distinguished keynote speakers, and all the participants. We also want to thank the publisher for publishing the proceedings. May the readers could enjoy the gain some valuable knowledge from the proceedings. We expect more and more experts and scholars from all over the world to join this international event next year. We gave a technical evaluation of the conference to those who needed them. The virtual conference's main problem is signal loss and the presence of technical error by its participant. In this regard, we gave awareness and notice to all of the participants about these problems.

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Eco-efficiency Level of Production Process of Waste Cooking Oil to be Biodiesel with Life Cycle Assessment

Sri Hartini*, Diana Puspitasari, Nabila Roudhatul Aisy, Yusuf Widharto

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Abstract. Lack of awareness and knowledge of environmental protection, many people discard cooking oil waste. According to several studies, cooking oil waste can be processed into more valuable products through certain processes that require energy and material. Biodiesel is an example. Beside biodiesel, the production process also produces non-product output. Thus, efforts to utilize cooking oil waste into more valuable products also have a negative impact on the environment. This study aims to measure the environmental impact of biodiesel production from waste cooking oil and compare it if it is discharged to landfill without the recycling process. Measurement of environmental impacts is carried out using a Life Cycle Assessment. Measurement of the environmental impact of biodiesel processing from cooking oil waste is based on a process carried out at a research institute. The measurement results state that the disposal of cooking oil waste has an adverse effect on the ecotoxicity category. Whereas the processing of cooking oil waste into biodiesel has advantages in the categories of climate change, the formation of photochemical oxidants, fine dust, oil and gas depletion, and water pressure indicators. the level of eco efficiency from processing waste cooking oil to biodiesel produces a value close to one which means that the production process is affordable but not yet sustainable.

1 Introduction

The issue of improper management of waste cooking oil (WCO) is attracting public concern and serious attention in recent years[1]. Indonesia is the largest palm oil producer in the world with palm oil as one of its derivative industries[2]. In 2018, Indonesia's crude palm oil production reaches 29 million tons, of which 28% is used for edible oil (8.41 million tons). The allocation of palm oil as cooking oil causes a high amount of waste and is harmful to the environment[3]. Fast food restaurants in big cities in China can produce cooking oil waste of about 15 litres every day[4]. In the Mediterranean country, one person produces 3-5 kg WCO each year[5]. A survey in the Greater Jakarta area concluded that 1,889,506 tons of waste cooking oil was dumped in the gutters and soil every week. A survey at 347 households in Semarang estimated that around 90.4% of households preferred

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Bibliometric analysis of the study on exposure evaluation to aerosol nano or ultrafine particles in the breathing zone

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Abstract. To map the advancement of exposure evaluation research for particles less than 100 nm in the breathing zone, we developed a bibliometric analysis using VosViewer 1.6.15 by collecting relevant publications from Scopus on August 10th, 2020. Of 769 relevant documents, 90.64 % (n = 697) came from the journal and used English as the language that started to be published in 1985. The results showed that research themes have grown on the three clusters related to inhaled nanoparticles exposure measurement, responses and effects, and their primary existence in consumer products. Moreover, depth analyses by visualizing maps of the top active countries, authors, and top-cited documents on the citation, co-citation, or co-occurrence have revealed several essential pieces of information on this research area. Our findings suggest that the greater depth on appropriate devices for exposure measurements, particularly in nano-sized, which matches with the metrics were needed. Through these efforts, the capabilities of analyses can improve for future inhaled nanoparticles exposure assessments.

1. Introduction

Regarding the development of nanotechnology, nanomaterials' use implies that the risks of particle less than 100 nm had spread to large environments, from workplaces as the production site until consumers in many forms of product. Previously, the sources of the general size-segregated particles from the combustion activities have also played as the contributors to the emission of nano or ultrafine particles, such as forest fires, volcanic eruptions, industrial chimneys, the exhaust of vehicles, and kitchens. Therefore, studies on the health effects of nano-sized particles have been extensively developed in the last two decades with nanotoxicological knowledge's critical role to comprehend the responses and make the adverse impacts identified in a more broad aspect [1-3]. Regarding the health and environmental risks, nanotechnology products, as the new contributors of nano-sized particles with combustion activities previously, need to concern for sustainable principles. While, the particulate matter in their size-segregated forms has been known can increasing respiratory morbidity and mortality [4,5].

Compared to the larger particles, nano-sized particles had more deposition rate to cross the pulmonary epithelium and reach the interstitium, which can be systematically distributed into the bloodstream to increase the possibility of increasing the level of inflammation [6,7]. Therefore, future effects of nano-



Construction of co-culture of microalgae with microorganisms for enhancing biomass production and wastewater treatment: a review

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Abstract. The development of microalgae cultivation in wastewater has been explored for years. Several wastewaters and nutrient sources related to biomass generation have been combined in recent years. On the other hand, several factors seem to reduce the possibility of industrialized this concept shortly. The growth rate and harvesting cost of the algae are often pointed as the leading cause of the gap for industrialization of this concept. In order to counteract these problems, constructing microalgae in the form of co-culture consortia with microorganisms, such as bacteria and yeast, have been reported to enhance the production of biomass under a short period of cultivation. This review highlights the strategies to combine microbial strains and microalgae for improving the process of biomass generation based on the comparison of the productivity of single and consortium of microalgae cultivation. Subsequently, mechanisms to enhance microalgae growth are scrutinized based on their interaction. Furthermore, critical factors regarding the construction of the consortia are discussed. Eventually, identifying gaps in this concept is displayed to describe the path of future focuses in this potential field.

1. Introduction

Microalgal biomass generation currently gains more attention since it has many possibilities to apply on an industrial scale and versatile applications [1]. Biomass products for secondary metabolites, lipid, and more fuel products are among the application of microalgae [2-4]. Low water footprint and higher productivity are mentioned as the advantages of microalgal biomass compared with terrestrial biomass from the crops and forests [5].

As microalgae cultivation faces nutrient source problems, coupling the cultivation with wastewater treatment rises as a promising method to grow the algae alongside the wastewater treatment process [6]. The high nutrient content of wastewater and the demand to remove the nutrient creates an opportunity to apply microalgae in the wastewater system to remove nutrients effectively [7]. At the end of this process, the outcomes are the biomass of algae and recovered water [8]. Production and harvesting processes are the most burdening factors for biofuel generation from microalgae [9]. The sequential process of flocculation and/or filter can only lead to the negative balance of the capital cost for such renewable energy [10]. Thus, many alternatives and solutions have addressed this barrier to reach biodiesel's feasibility generated from algae.



Recent advances in the stabilization of expansive soils using waste materials: A review

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Abstract. The increasing population necessitates infrastructural development, and these civil engineering infrastructures are constructed on soils. Highways, buildings, bridges, railways, and dams need a strong foundation; however, some soils are not suitable for making a strong foundation. An example is expansive or reactive soils. Expansive soils are subjected to volumetric changes, thus the biggest challenge that geotechnical engineers encounter in the field. In an attempt to make these poor soils more appropriate for use in engineering projects, different stabilization techniques are used. However, well-established stabilizers like cement, lime, and bitumen are associated with environmental challenges. This has attracted the attention of the researchers to look for environmentally friendly and sustainable stabilizers. The current study provides a review of the recent trends in improving the geotechnical properties of expansive soils using waste materials, focusing on their efficacy, the optimum percentage, and research gaps. Wastes considered in this study include waste tires, sawdust, and sawdust ash, and fly ash. The review utilized research articles extracted from different databases, such as Science Direct, Google Scholar, Scopus, Web of Science, and Google. This work could give the geotechnical engineers and independent researchers insight into the recent soil stabilization trends that could lead to sustainable development.

1. Introduction

Various soils are used during the construction of civil engineering structures. However, some soils are suitable, while others are unsuitable for civil engineering purposes [1]. One example of unsuitable soils that cause severe damage to engineering structures' foundations includes expansive clay [2]. These soils experience massive volume changes due to their high affinity to water. Expansive soils have a record of swelling during the wet season and shrinking during the dry season, and the cause of these behaviors could be the presence of a mineral with an enlarging matrix [1], [3], [4]. In most parts of the world, soils with desirable properties are transported from quarries that are at times far from the construction project site. This raises the construction costs of the project in terms of excavation and transportation costs, and for that matter, there is a need for shifting to locally available stabilization materials.

The history of expansive subgrade soil stabilization can be traced way back to the 1950s, and since then, researchers continued looking for better and sustainable ways of soil stabilization [5]. Dubose [6] experimented using a compaction method to control heaving in clay soils. In 1958, Jones conducted laboratory studies on improving the geotechnical properties of reactive clay soils using hydrated lime

